

REMARKS

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Claim Amendments

Claim 1 has been amended to recite a knot strength of at least 650 MPa, based upon page 8, lines 19-20 of Applicants' specification.

The claims have also been amended to better conform with U.S. practice.

No new matter has been added to the claims by the above amendments.

Rejection of Claims Under 35 U.S.C. § 112, Second Paragraph

The rejection of claims 1-5, 10 and 11 as being indefinite under 35 U.S.C. § 112, second paragraph is respectfully traversed.

The Examiner takes the position that claim 1 is indefinite for claiming properties instead of chemical or structural features, or methods to obtain the chemical or structural features. The Examiner further states that "[c]laims merely setting forth physical characteristics desired in an article, and not setting forth [a] specific composition which would meet such characteristics are invalid as vague, indefinite, and functional. . ." Lastly, the Examiner asserts that "it is necessary that the product be described with sufficient particularity that it can be identified so that one can determine what will and will not infringe."

Applicants respectfully disagree with the Examiner's positions for the following reasons.

First, in response to the Examiner's position that the claims are indefinite for claiming properties rather than chemical or structural features, Applicant refers to MPEP 2173.05(t), which states that "a compound of unknown structure may be claimed by a combination of physical and chemical characteristics. See *Ex parte Brian*, 118 USPQ 242 (Bd. App. 1958)." Thus, contrary to the Examiner's assertion, a claim is not indefinite merely for claiming a combination of physical and chemical characteristics.

Second, the Examiner's position regarding "claims merely setting forth physical characteristics and not setting forth a specific composition" is irrelevant to the instant application, since Applicants' claims do recite a composition, i.e. a vinylidene fluoride resin monofilament comprising a vinylidene fluorine resin having the recited properties.

Third, Applicants' claims clearly set forth the metes and bounds of the invention, i.e. a composition which possesses particular properties. The Examiner appears to take the position that the claims are indefinite, merely because they contain language directed to properties. However, this position is untenable.

MPEP states that the definiteness of claim language must be analyzed, not in a vacuum, but in light of the content of the particular application disclosure, the teachings of the prior art, and the claim interpretation which would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made. In this case, Applicants' specification clearly describes that each of the properties recited in Applicants' claims may be reliably determined, according to the methods described on page 12, line 24 to page 13, line 4, page 13, line 5 to page 5, line 10 and page 9 lines 24 to page 25, line 25. Accordingly, one skilled in the art, upon reading Applicants' claims, in light of the specification and the knowledge of one skilled in the art, would clearly understand the metes and bounds of the claimed invention.

Furthermore, Applicants enclose herewith a copy of Section 5.36 of PCT International Search and Preliminary Examination Guidelines (Attachment A), which states, in relevant part, "5.36 . . . Definition of a product solely by its parameters may be appropriate in those cases where the invention cannot be adequately defined in any other way, provided that those parameters can be clearly and reliably determined . . . by indications in the description. . ."

Lastly, in response to the Examiner's position that a product must be described with sufficient particularity that it can be identified so that one can determine what will infringe, Applicants respectfully assert that their claims meet this requirement. The Examiner's position

otherwise would suggest that she believes any claim which recites properties should be rendered indefinite, since one would not know if they infringe. Applicants assert that this position is clearly untenable, as properties as claim limitations are clearly acceptable under U.S. patent law.

For the above reasons, it is clear that Applicants' claims are not indefinite, as asserted by the Examiner. Accordingly, the above rejection is untenable and should be withdrawn.

Patentability Arguments

The patentability of the present invention over the disclosures of the references relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

Discussion of Applicants' Invention

Applicants' invention is directed to a vinylidene fluoride resin monofilament suitable for fishing lines (and a process for production thereof). As disclosed at page 1, lines 14-25 of Applicants' specification, a monofilament of vinylidene fluoride resin has many advantageous features for use as fishing lines, such as tenacity, impact resistance, tensile force-transmitting property, weatherability, high specific gravity, a refractive index close to that of water, no hygroscopicity, and a high knot-strength. However, vinylidene fluoride resin, particularly one having a high molecular weight for providing high mechanical strengths, has a high crystallinity and a high elastic modulus resulting in a rigid monofilament. This leads to the liability of twisting after unwinding from a spool followed by stretching and/or continuation of fishing.

Applicants' invention has succeeded in providing a vinylidene fluoride resin monofilament having a high molecular weight (as represented by a high inherent viscosity (η_{inh}) and a high knot strength, which also shows an excellent resistance to "twisting" (represented by a high twist index of at least 0.90). Although not limiting on the scope of the composition claims,

Applicants achieved the above-discussed invention by a process such as that recited in claim 6. Such a process is especially characterized by a high-temperature relaxation treatment for an extremely short period of 0.05 - 0.5 sec. within a high-temperature heating oil bath at a temperature of 140 - 175°C, after melt-spinning and stretching.

Rejections Based on Endo et al. (U.S. 4,302,556)
or Sato et al. (U.S. 2003/0004292)

The rejection of claims 1, 2, 4, 5 and 10 under 35 U.S.C. 102(a), 102(b) and 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Endo et al. (U.S. 4,302,556) is respectfully traversed.

Additionally, the rejection of claims 1-5 and 10 under 35 U.S.C. 102(a), 102(b) and 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sato et al. (U.S. 2003/0004292) is respectfully traversed.

Endo et al. and Sato et al. are understood to disclose vinylidene fluoride resin monofilaments showing mechanical strengths which are generally comparable to those of the present invention. However, these references have failed to provide a vinylidene fluoride resin monofilament showing a high twist index of at least 0.90, as recited in Applicants' claims. This is understood for the reasons set forth in the following discussion.

Endo et al. disclose a process of Example 2 (as noted by the Examiner) including steps of subjecting a vinylidene fluoride resin monofilament of $\eta_{inh} = 1.5$ dl/g to first stretching at a ratio of 5.6, second stretching at a ratio of 1.2 (giving a total ratio of 6.72) and relaxation of 5% at 80°C to obtain a monofilament showing a knot strength of 69.3 kg/mm² (= 680 MPa).

The above process is comparable to the process of Comparative Example 2 of Applicants' specification, including steps of subjecting a vinylidene fluoride resin monofilament having a core resin of $\eta_{inh} = 1.5$ dl/g (and a sheath resin of $\eta_{inh} = 1.3$ dl/g) to first stretching at

a ratio of 5.8, second stretching at a ratio of 1.06 (giving a total ratio of 6.17) and relaxation of 6% at 87°C to obtain a monofilament showing a knot strength of 667 MPa (comparable to the 680 MPa of Endo et al.). However, this monofilament also shows a lower twist index of 0.87 at 3 hours after release of load.

Accordingly, the monofilament of Example 2 of Endo et al. is understood to have a twist index around 0.87, or even lower than 0.87 because of a lack of the relatively soft sheath of $\eta_{inh} = 1.3$ dl/g used in Comparative Example 2. This twist index is clearly lower than that recited in Applicants' claims.

Example 1 of Sato et al. discloses a process including steps of subjecting a vinylidene fluoride resin monofilament having a core resin of $\eta_{inh} = 1.55$ dl/g and a sheath resin of $\eta_{inh} = 1.3$ dl/g to first stretching at a ratio of 5.82, second stretching giving a total ratio of 6.17 and relaxation of 5% at 250°C(dry) to obtain a monofilament showing a knot strength of 64.8 kg/mm² (=635 MPa).

The above process is comparable to the process of Comparative Example 4 of Applicants' specification, including steps of subjecting a vinylidene fluoride resin monofilament having a core resin of $\eta_{inh} = 1.7$ dl/g and a sheath resin of $\eta_{inh} = 1.3$ dl/g to first stretching at a ratio of 5.45, second stretching at a ratio of 1.15 (giving a total ratio of 6.27) and relaxation of 7% at 240°C (dry) to obtain a monofilament showing a knot strength of 724 MPa. However, this monofilament also shows a lower twist index of 0.87 at 3 hours after release of load.

Accordingly, the monofilament of Sato et al. is also understood to have a twist index of around 0.87, which is substantially lower than the lower limit of 0.90, as recited in Applicants' claims.

Applicants' claims are only anticipated if each and every element, as set forth in Applicants' claims is found, either expressly or inherently described, in a single prior art reference. For the reasons discussed above, Endo et al. and Sato et al. each fail to teach

Applicants' recited limitation of a twist index of at least 0.90. Accordingly, neither of these references anticipates Applicants' claims.

Furthermore, neither of the references renders Applicants' claims obvious, because neither reference suggests a composition with Applicants' recited properties, nor indicates how such a composition would be achieved.

The Examiner states that the cited references are presumed to have the recited properties, i.e. twist index of at least 0.90, unless Applicants prove otherwise. Applicants have proven otherwise, and therefore, the subject matter of Applicants' rejected claims is clearly patentable over the cited references.

Rejection Based on Nakano (U.S. 6,170,192)

The rejection of claims 1, 2, 4, 5 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Nakano et al. (U.S. 6,170,192) is respectfully traversed.

As discussed above, Applicants have amended the claims to require a knot strength of 650 MPa.

High mechanical strength and high twist index (i.e., improved resistance to twisting) are generally in a relationship of trading off of each other. Nakano et al. fail to disclose a technology providing a vinylidene fluoride resin monofilament satisfying both of these properties. This is demonstrated by the knot strengths shown in Table 2 in column 6 of the reference, which are clearly lower than the lower limit of 650 MPa in Applicants' claims.

Therefore, the subject matter of Applicants' rejected claims is clearly patentable over the cited reference.

Rejections Based on Endo et al. or Sato et al. in view of Boese (U.S. 3,903,635)

The rejections of claim 11 under 35 U.S.C. 103(a) as obvious over Endo et al. or Sato et al. in view of Boese (U.S. 3,903,635) are respectfully traversed.

Since claim 11 is indirectly dependent upon claim 1, the comments set forth above concerning claim 1 are equally applicable to this rejection. Specifically, claim 11 is patentable over Endo et al. and Sato et al. for the same reasons claim 1 is patentable over these references.

Additionally, the Examiner has relied upon Boese merely to teach a typical fishing rod assembly. Therefore, Boese fails to remedy the deficiencies of the primary references.

Accordingly, these rejections are untenable and should be withdrawn.

Closing Discussion

In contrast to the above discussed primary references, Applicants' invention has succeeded in providing a vinylidene fluoride resin monofilament having a high molecular weight (as represented by a high inherent viscosity (η_{inh})) and a high knot strength and yet showing an excellent resistance to "twisting" represented by a high twist index of at least 0.90. Although not limiting on the scope of the composition claims, Applicants achieved the above-discussed invention by a process such as that recited in claim 6. Such a process is especially characterized by a high-temperature relaxation treatment for an extremely short period of 0.05 - 0.5 sec. within a high-temperature heating oil bath at a temperature of 140 - 175°C, after melt-spinning and stretching. The high temperature oil heat-relaxation process for an extremely short period is believed to be effective for removing residual strain after the stretching at the amorphous and semi-crystalline portions of the monofilament, without substantially adversely affecting the crystalline portion responsible for mechanical strengths of crystalline vinylidene fluoride resin monofilament. This is believed to be the reason why the vinylidene fluoride resin monofilament of the present invention can exhibit excellent mechanical strengths as well as excellent twist resistance which is persistent with time.

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Conclusion

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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